DOCUMENT RESUME

ED 448 721 IR 020 484

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TITLE	A Study of Students' Perceived Learning in a Web-Based Online Environment.
PUB DATE	1999-10-00
NOTE	7p.; In: WebNet 99 World Conference on the WWW and Internet Proceedings Honolulu, Hawaii, October 24-30, 1999); see IR 020 454.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Mediated Communication; Computer Uses in Education; Correlation; Discussion (Teaching Technique); *Distance Education; Higher Education; *Instructional Effectiveness; Interaction; Multiple Regression Analysis; Predictor Variables; Student Attitudes; Student Surveys; Teacher Student Relationship; *World Wide Web
IDENTIFIERS	Learning Environments; State University Of New York; *Web Based Instruction

ABSTRACT

The purpose of this study was to find what factors were associated with students' perceptions of learning in online courses. Survey data were collected from students enrolled in 78 courses offered through the SUNY (State University of New York) Learning Network in the fall of 1997. Correlation and multiple regression analyses were employed. The dependent variable was students' perceived learning that was correlated with the following 11 independent variables: instructor-student interaction; instructor-student communication; instructor evaluation; instructor responses; student-student interaction; student-student communication; online discussion; written assignments; learning style; prior computer competency; and time spent on a course. Results indicate that the amount of student-instructor interaction and the online discussion activity played an important role in predicting students' perceived learning. The implication of this finding is that it is not only important to create an interactive environment for learning, but it is also important to design discussion activities that can trigger rich and meaningful online discourse. (Contains 16 references.) (Author/MES)

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ED 448 721

Webnet 99, Session # 5302

A Study of Students' Perceived Learning in a Web-based Online Environment

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Abstract: The purpose of the study was to find what factors were perceived to be associated with students' perceptions of learning in online courses. Survey data were collected from students enrolled in 78 courses offered through the SUNY Learning Network in the fall of 1997. Correlation and multiple regression analyses were employed. The dependent variable was students' perceived learning that was correlated with eleven independent variables. Results indicated that the amount of student-instructor interaction and the online discussion activity played an important role in predicting students' perceived learning. The implication of this finding is that it is not only important to create an interactive environment for learning, but also important to design discussion activities that can trigger rich and meaningful online discourse.

1. Introduction

As more and more college courses are offered on the World Wide Web, either partially or entirely, quality of instruction and learning is becoming increasingly an issue that needs to be addressed. It is without doubt that the Web is an unprecentedly rich and convenient medium for instruction and learning, yet, this new medium at the same time poses so many unknown aspects that demand an immediate investigation to ensue quality of instruction and learning. We do not know how various learning activities of a course and the instructor's behaviors are perceived to be related to students' learning achievements. Thus far few studies back their discussions by statistically examining the relations between various factors and students' perceived learning in an entirely Web-based environment (see Jiang, 1998). This study was designed to examine the relations between them. The study used survey data collected from students enrolled in 78 courses offered through the SUNY Learning Network in the fall of 1997. The purpose of the study was to find what factors were perceived to be associated with students' perceptions of learning in online courses.

2. Methodology

The study used survey data collected from 78 Web-based courses delivered through the State University of New York Learning Network in the fall of 1997. Since these 78 courses were in different subject areas and at different levels, it was not possible to use a generic instrument to measure students' learning achievements. Thus, a survey was used to achieve the purpose. An electronic survey, consisting of 14 questions, was administered to all students enrolled in the 78 courses of the fall 97 term. Altogether 287 students responded to the survey; the response rate was 58%. This response rate was based on those students who enrolled and finished the courses, excluding students who dropped off or remained inactive through the semester. This procedure is considered as providing a more direct indicator of a method's response-inducing capabilities than do other methods (Dillman, 1978, Anderson, 1997).

Correlation and multiple regression analyses were employed. The dependent variable was students' perceived learning. Eleven independent variables focused on the contributions of two major online learning activities, two

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instructional behaviors, students' interactions with instructor and fellow students. Selection of variables was based on the concepts of collaborative online learning (Harasim, 1990; Kaye, 1992; Hiltz, 1990; McConnel, 1992; Simon, 1992; Hartman et al., 1995; Fabro, 1996; Lundgren-Cayrol, 1996; Berge, 1997), Vygotsky's (1986) interaction theory, Collins et al.'s (1991) cognitive apprenticeship. We also took into consideration the design of SLN courses (see Jiang, 1998). The variables used in this study are summarized in Table 1. Variables for the correlation analysis.

Table 1. Variables for the correlation analysis (N=287)

Perceived learning	**Perceived instructor behavior**	**Perceived Student behavior**	**Perceived contributions of learning activities**	**Other variables**
perceived learning	instructor-student interaction	student-student interaction	online discussion	learning style
	instructor-student communication	student-student communication	written assignments	prior computer competency
	instructor evaluation			time spent on a course
	Instructor responses			

2. 1 Correlation analysis

Results of correlation analysis showed that all the independent variables except one were significantly related to perceived learning (see Appendix: Table 2. Interrelations among the variables for the study). The variable that was not related to perceived learning was prior computer competency. This supports results from our survey on the ease of use of technology (Jiang, 1997). Results of that survey indicated that the majority of the respondents thought the SLN Web environment was easy to work with (Jiang, 1997). That might explain why students' entrance level of computer skills would not influence their perceived learning.

2.2 Multiple regression

In order to find out which variables could best explain the variance in perceived learning, multiple stepwise regression was run. One pair of variables, students' perceived communications with instructor and with fellow students, was dropped off from the multiple regression analysis due to conceptual overlapping with two other variables, students' perceived interactions with instructor and fellow students. The variable, students' computer competency, was not included in the regression because it was not significantly related to the perceived learning. The remaining eight variables were used for multiple stepwise regression to predict students' perceived learning.

Results of the Stepwise Regression showed that four predictors were entered in the equation: 1) online discussions; 2) instructor-student interaction; 3) time spent on course; 4) written assignments (see Table 3. Summary of Multiple Stepwise Regression analysis for variables predicting perceived learning).

Table 3. Summary of Multiple Stepwise Regression analysis for variables predicting perceived learning (N = 287)

Variables in the Equation

Variable	B	SE B	β
Online discussions	.19	.06	.18***
Instructor-student interaction	.32	.04	.41***
Time on course	-.10	.04	-.11*

Written assignments	16	06	13**

Variables not in the Equation

Variable	Beta In	Partial	Min Toler
Evaluation	.10	.11	.73
Student-student interaction	.08	.08	.64
Instructor responses	.06	.06	.69
Learning style	.09	.10	.76

Note: R^2 = .33
*** p < .001, ** p < .01, * p < .05

The multiple coefficient between the criterion (perceived learning) and the best linear combination of the four predictors was R = .58. It can be said that 33% of the variation in students' perceived learning could be predicted on the basis of the four predictors. An F of 34.60 on four predictors and 275 *df* was significant beyond p = .05, and we conclude that we can predict at better than chance levels.

3. Discussion

Results indicated that students valued their interaction with the instructor, their online capable partner. It has the largest regression coefficient, B = .32 ($p < .001$) and an increment of .28 (R^2). The significant correlation between students' perception of learning and their perceived interaction with their instructor (r = .53, $p < .001$) also indicates the important and indispensable role of the instructor in online environments. The finding is congruent with Vygotsky's concept of the role of interaction with a capable partner in the learning process.

The learning activity, online discussions, has the second most significant regression coefficient B =.19 ($p < .001$). The correlation analysis found a significant correlation between students' perceived learning and their perception of the contribution of online discussions (r = .38, $p < .001$). It seems that the more students found their participation in online discussions had contributed to their learning, the more learning they perceived to have experienced. This finding is in line with our earlier finding that students' perceived learning was significantly correlated to percent of grade weight assigned to students' participation in discussions (Jiang, 1998; Jiang and Ting, 1998). The implication of this finding is that it is not only important to create an interactive environment for learning, but also important to design discussion activities that will trigger rich and meaningful online discourse.

Written assignments were also found to be a significant contributor to perceived learning (B =.16, $p < .01$). This contradicted findings in our earlier studies. It was found that percent of grade weight assigned to written assignments was not significantly related to students' perceived learning. Our argument was that online written assignments were not much different from the traditional classroom written assignments that are common and major learning activities for students in college courses. We believed that that was of the reasons why the percent of grade for written assignments did not significantly influence students' perceived learning. Another reason might be the small sample size (N = 17) for that study. In this study which was based on survey data, students perceived written assignments as contributing to their learning nearly equally as they did the discussion activity, though students seemed to value a little bit more the interactive learning activity - online discussions - than the written assignments in this online environment.

Time spent on course has a significant but negative regression coefficient (B = -.10, $p < .05$). The correlation analysis also revealed a significant but negative coefficient (r = -.18, $p < .01$). These findings seem to contradict our common sense expectation. In a classroom setting, we would normally expect better learning if students spend more time on a course. One possible explanation for the negative coefficients is that these courses were online courses and there were many extraneous factors related to the amount of time spent on a course such as ease of navigation in a course, speed of students' equipment, instructional design of learning activities, clarity of instructions of how to work on learning activities. Since we did not inquire how students had spent their time on a

course, it remains a question for future study to find out why time spent on course was negatively related to students' perceived learning.

4. Conclusions

SUNY Learning Network used one single template for all the 78 courses offered in the fall of 1997. This unique feature offered a good opportunity to make inquiries about students' perceptions of their learning in this online environment and to find out factors that were associated with their perceived learning. Since the courses were of different subjects and at different academic levels, a generic measurement of learning achievements was not feasible. Although a survey study like this has limitations in reflecting students' learning achievements, it provides us with some information about how students thought about various learning activities, instructional behaviors and their relations to students' perceived learning. Such information will provide some basis for improving design of future Web-based courses. The findings of the study indicate the importance of an interactive learning environment and the online support from an instructor. Future design of web-based online courses should emphasize the role of online discussions and create an environment to ensure meaningful discourse among students and the instructor.

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6. Appendix

Table 2. Interrelations among variables (N = 287)

	1	2	3	4	5	6	7	8	9
1. Instructor-student communication									
2. Student-student communication	.57***								
3. Online discussion	.40***	.45***							
4. Instructor-student interaction	.66***	.45***	.43***						
5. Student-student interaction	.44***	.67***	.52***	.50***					
6. Instructor responses	.36***	.30***	.50***	.39***	.31***				
7. Perceived learning	.55***	.46***	.38***	.53**8	.36***	.33***			
8. Written assignments	.16**	.04	.14*	.20***	.06	.26***	.24***		
9. Evaluation	.28***	.14*	.26***	.37***	.21***	.38***	.34***	.42***	
10. Time on learning	-.26**	-.17**	-.04	-.14*	-.07	-.07	-.18*	-.05	.42***
11. Learning style	.13*	.15*	-.02	.11	.17**	-.00	.12*	.01	-.04
12. Prior computer competency	.11	.01	.06	.11	.13*	.12*	.03	.03	.13*

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

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